

16. In the Echeineidæ. Oval and furcate, deeply grooved.
17. In the Murænidæ. Oval (as in *Conger* and *Anguilla*); globular (as in *Leptocephalus*).
18. In the Anguillidæ. Elongate (as in *Ammodytes*).
19. In the Syngnathidæ. Globular.
20. In the Gymnodontidæ. Globular and very irregular (as in *Tetrodon*).
21. In the Sclerodermi. Irregular, posteriorly acuminate (as in *Balistes*).

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Stray Notes on some of the smaller Crustaceans. Note II. On the Habits, &c. of the *Hyperiidæ*. By THOMAS EDWARD, A.L.S.

[Read December 6, 1866.]

As intimated in my last, I would now speak more fully of the other three species alluded to, viz. *H. oblivia*, *medusarum*, and *minuta*.

Although I have, as already stated, occasionally taken both the others from the *Medusa*, I have never as yet met with, nor seen, even so much as a single specimen of either of these attached to anything. And of the first (*H. oblivia*) which seems to me to be the most abundant of the whole tribe, at least in this quarter, I have seen thousands, nay, millions, or countless hordes. So numerous are they occasionally, that I have seen the water to a certain extent darkened by them; and this was the case when not a single *Rhizostoma* was within view, or perhaps on the coast. And instead of the *Hyperia* assailing the fish, the latter would seem to have become the aggressors; for the stomachs of many of those that were caught about the periods referred to were generally well stored with these Crustaceans.

On one occasion, and in winter, immense shoals of the common Herring (*Clupea harengus*) chanced to visit us—a rather rare case; and great numbers were taken. About two dozen of these came into my household, and, as is my usual practice with all kinds of fresh fish, I of course looked into their stomachs to see what could be got there. On doing this I was rather surprised to find them all full of this Amphipod, as I had never before found them in the herring. This caused more to be procured, which were caught the day after, and I found their stomachs full also. From one I took 59, from another 47, and from a third 33; and all the others were more or less well crammed.

These statements are not on hearsay. They refer to undeniable facts which came under my own personal observation.

Now, if all the herrings composing these shoals had been as well supplied as those I dissected (and we cannot tell that they were not), how amazing must have been the number of this Crustacean! It is likewise worthy of remark that these herrings were taken at from four to five miles from land, or perhaps more.

Again, I have also seen them cast on shore during gales from the north (Banff lies on the south side of the Moray Firth) in most enormous and incalculable numbers. On one occasion, and for some distance, our rock-pools were filled with literally one living mass of them. But if I was astonished at this, what was my surprise, on reaching the sands which run continuous with the rocks alluded to, at beholding a ridge or wall of these animals extending more than a hundred feet in length, and varying from 1 to 2 inches in height and breadth, which had been washed up by the sea! And, instead of lessening, each succeeding wave only added thousands upon thousands to the general wreck. On another occasion a still larger portion of the sands were again strewn in a similar manner; but there were none then in the rock-pools. They would appear to come inshore in great bodies at times, in search of food perhaps; and should a storm arise, they are then of course unable to work their way out, and are in consequence inevitably overwhelmed in ruin by being tossed on land.

From these facts, something like at least a vague idea may be formed as to the prodigious numbers of this species. But it is only those who have been blessed with a sight of the vast legions which occasionally appear who can form anything like a true estimate of the fact.

I cannot, however, say so much for, nor of, the other two species. Whatever they may be elsewhere, they are the scarcest of the genus here. I have only taken *H. medusarum* on three or four occasions, and but a few each time.

This species is decidedly the gem of the whole. It is partially pellucid, being beautifully banded, alternately, with rings of a crystal hue and others of a deep red.

As regards *H. minuta*, I have only taken it twice, and even in fewer numbers than the last.

Having kept these alive also, I am enabled in some measure to say that in their general manners all three resemble each other, their restlessness and activity being one of their most remarkable traits, and beyond the power of description. But if I were to particularize any of them as being more lively and more restless than the rest, I certainly should give *H. minuta* the character, as

being the most active species which, so far as I remember, I have as yet seen. All three seem to me far more active in their whole movements than either of their congeners, *L. Kinahani* or *H. galba*, and they do much better in confinement.

It strikes me very forcibly that these are what some would call carnivorous in their diet; at least I am pretty sure that *H. oblivia* is, and am inclined to think that the others are so likewise, from the fact that their habits are so alike in every other respect.

On one occasion I put a few individuals of *Hyperia oblivia* beside some shrimps (*Crangon*, *Mysis*, &c.). On looking again some time after, I saw one of the *Hyperia* on the back of a *Mysis*. I also observed the latter give some strange jerks with its tail, but took no further notice of the circumstance, not dreading anything serious. The shrimp was swimming at the time with the burden on its shoulder. This was in the evening. Next morning I found both at the bottom, still together, but the shrimp dead. This drew my attention more closely to the case, and I endeavoured to drive the *Hyperia* away; but, although I twirled him with a camels'-hair brush for several minutes, I failed in my object; and it was not until I had the *Mysis* at the top of the water that he condescended to let go. I then examined the shrimp, and found an incision at the extreme end of the carapace, and just where the soft part of the body commences, and so deep that the animal broke in two on being again lifted. I am not saying from this, however—at least I do not affirm it as a truth, that the *Hyperia* killed the shrimp; but I believe he did, and, by way of making food, had scooped out the part alluded to. I have lost shrimps in this way before, without very well knowing why. I likewise find various of the softer species when cast on shore treated in the same fashion when the *Hyperia*, and especially *H. oblivia*, are on the coast. They appear well enough until you attempt to take them up, when they in most cases break either into two or three pieces. Fragments, too, are often thrown up. I know that *Eurydice pulchra*, the little tyrant of the shore, is a great enemy to the shrimp, and many others of his kind, but I am much mistaken if some of the *Hyperia* are not something similar.

It would seem that not a few of our Crustaceans, like several species of birds and fish, &c., are to some extent migratory; and perhaps to no portion does the term apply so much as to those now under consideration. Although they may not exactly observe the same regularity and order as some other of our migrants do, still I am certain that they do make periodical, or in some cases

it may be but casual visits, at least to this part of the kingdom. I have never yet missed *H. oblivia* a single season since I began to look to these things, and was able to go out. The same may almost be said of *L. Kinahani* and *H. galba*. But although I have not met with these so invariably, nor even with *H. medusarum* and *minuta*, still that is no proof that they are not as regular, or nearly so, in their visits as *H. oblivia*, though fewer in numbers. It is hardly possible, in fact it is impossible, that one individual could see all that happened every year, even in this small way and though but in a single district; still I think I am not far from the mark. It will be as well, however, in the meantime, perhaps, to look upon *H. medusarum* and *H. minuta*, but especially the latter, as but casual or accidental visitors only. And it is, I believe, during these peregrinations that on coming too near the land so many of them, as in the case of *H. oblivia*, are occasionally washed in and destroyed.

*Lestrigonus Kinahani* and *Hyperia galba* generally appear here about the beginning of July, and disappear again towards the end of September; *H. oblivia* usually about August, and continues till spring; *H. medusarum* in December, and remains till March (on one occasion I took two of this species as late as the month of May); and the time I found *H. minuta* was from October to December. During these periods, too, I have never failed to find the females of all, save the first, to contain, in some cases eggs, in others well-developed young. With reference to *H. oblivia*, I not unfrequently find females of this species with young from September to January, thus extending over a period of five months.

Although I have taken *H. oblivia* from the stomachs of different species of fish besides the herring, I have never yet found any of the other in a heterogeneous repository of the kind.

There is yet another circumstance which I would here mention, as being, in some measure, in connexion with my subject. Of itself, however, it may be of little or no value, but when taken in conjunction with the others will, I trust, be at least found worthy of record. It is that, during some seasons when the *Medusæ* were very plentiful, I have noticed that the *Hyperia* (I here allude only to *L. Kinahani* and *H. galba*) would be remarkably few, and *vice versâ*. And during no season, within my recollection, has this been so much and so strikingly the case as in the present (1866), the *Medusæ* having been far more numerous here than ever they were known before. Now, and from this circumstance,

there are many, no doubt, who would have expected that at least a portion of the Hyperiidæ would be equally abundant.

But what was really the case? Why, scarcely any *Hypericæ* at all—that is, so far as I have observed. True, I have not been able, from ill health, to look after the matter so much, nor give it the attention, this summer, that I should have liked; still I have been out; and had they been there, I do not think they could have escaped my notice.

It chanced that one day in July, and two in August, great hordes of the *Medusæ* were cast in upon our beach; and out of many hundreds of these, which I had the satisfaction of examining, and that carefully too, I only got seven *Hypericæ*—one *L. Kinahani*, and six *H. galbæ*. The first was adult, but none of the others. Two, on these occasions, were the most found in a single *Medusa*. Thus these seven, and about thirty others which I obtained free, are all my season's take—that is, of these two species—making in all about two score. Yes, only two score, and that, too, when, as I have already stated, the *Medusæ* were in such prodigious shoals that they were never known to be so numerous in this part of the sea before.

On the other hand, I have met with *L. Kinahani* and *H. galba* very plentiful whilst not a *Medusa* was to be seen and there was perhaps not one in this part of the Firth.

Such, then, are a few and rather briefly told facts concerning these curious and interesting creatures—a genus whose true habits and economy seem, as yet, to be but little understood. And if I have been able to add to their general character even but one single fact not hitherto known, I shall consider myself well rewarded for my time and labour—a labour which is to me at all times a pleasant occupation.

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Experimental Investigations with Cestoid Entozoa. By T. S. COBBOLD, M.D., F.R.S., F.L.S., Lecturer on Comparative Anatomy at the Middlesex Hospital.

[Read Nov. 1, 1866.]

Having from time to time in conjunction with Professor Simonds carried on a series of experiments which (so far, at least, as I was concerned) were originally promoted by a small grant of money placed at my disposal by the General Committee of the British Association, the present record may, in some sense, be regarded as a continuation of our joint Paper communi-